

REMARKS

In accordance with the foregoing, claims 2 and 3 are amended. No new matter is being presented, and approval and entry are respectfully requested. Claims 6-13 are cancelled without prejudice. Claims 1-5 and 14-18 are pending and under consideration. Reconsideration is respectfully requested.

Applicants respectfully request entry of this amendment under 37 CFR §1.116 because the amendments do not significantly alter the scope of the claims and place the application at least into a better form for appeal. No new features or new issues are being raised.

The Manual of Patent Examining Procedures (MPEP) sets forth in §714.12 that “[a]ny amendment that would place the case either in condition for allowance or in better form for appeal may be entered.” (Underlining added for emphasis). Moreover, MPEP §714.13 sets forth that “[t]he Proposed Amendment should be given sufficient consideration to determine whether the claims are in condition for allowance and/or whether the issues on appeal are simplified.” The Manual of Patent Examining Procedures further articulates that the reason for any non-entry should be explained expressly in the Advisory Action.

CLAIM REJECTIONS UNDER 35 USC § 112 AND CLAIM OBJECTION

Claims 2 and 3 are rejected under 35 USC §112, second paragraph relative to the significance of D used therein. Claims 2 and 3 are amended herewith to clarify the significance of D. No new matter is added. The claim amendment is fully supported by the originally filed specification, for example, page 19, line 13.

The informality noted in the Office Action relative to claim 2 is corrected herewith.

In view of the claim amendments, Applicants respectfully request the rejections and objection to be withdrawn.

CLAIM REJECTIONS UNDER 35 USC § 103

Claims 1-5 and 14-19 are rejected under 35 USC §103(a) as allegedly being unpatentable over JP 53-77848 (hereinafter “848”) or JP 2000-345373 (“373”).

On page 3 lines 5-9 of the outstanding Office Action, the Examiner submits that the Japanese references fail to specifically teach all the features recited in the claims, but takes the position that “one of ordinary skill in the art would chose a desirable hole or cavity dimension because modifying such is just a matter of design choice.”

Applicants respectfully submit that the metal photoetching product having the claimed characteristics has superior quality that cannot be obtained by the methods described in the 848 and 373 references. These characteristics are more than a design choice and the Office Action has not met the burden of proof that a product with the indicated features can be manufactured based on the methods described in the cited prior art references.

Reference 848 discloses that a first etching forms a cavity, and then a second etching is conducted using the cavity. In reference 848, after the first etching is conducted using a photoresist as a mask, residue of the photoresist is used again as a mask for the second etching. Therefore, unlike the claimed products of the subject application, the form and size of holes which are used for second etching are difficult to control. Thus, when using the method described in reference 848, producing a metal photoetching product which has the high quality controlled dimensions recited in the claims is not proven feasible.

FIG. 4 in 848, illustrates in the upper panel a photograph of a surface of a metal screen generated by the method in 848 and in the lower panel a photograph of the opposite side of the metal screen. The diameter of circles shown in upper panel of Fig. 4, which are generated by etching, are almost the same as the ones in the lower panel of Fig. 4. A person of ordinary skill in the art would recognize that the etching factor achieved by 848 is poor compared with the claimed values.

Reference 373 discloses a method wherein etching is conducted by both upper and lower surfaces of a metal substrate. Etching is conducted twice in 373. However, it is unlikely a person of ordinary skill in the art to be able to achieve a metal photoetching product with a large cavity and a small cavity having the claimed etching factor.

References 848 and 373 do not render obvious the claimed metal photoetching product nor a method which can produce such a product. The claimed metal photoetching products cannot be produced by a person with ordinary skill in the art based on the disclosures of 848 and 373.

The metal photoetching product of claim 1 demonstrates excellent performance, when it is used as a structural part of a filter which has fine holes, for example. The metal photoetching product of Claim 1 is an etching product which has at least plural small cavities provided in a large cavity. When this etching product is used as a filter, fine materials, which are required to be removed, cannot pass through the small cavities of the filter due to the structure thereof, and therefore the fine materials can be removed. Furthermore, pressure can be efficiently provided on the small cavities due to the presence of the large cavity, to achieve excellent filtration

efficiency. Furthermore, due to the large and sufficient etching factor of the filter, the filter has an excellent degree of hardness which can sufficiently bear the pressure applied to the filter, since the thickness of a portion to which the small cavities are provided can be increased. In this way, the filter has an excellent degree of hardness, filtration efficiency of the filter is excellent since pressure can be efficiently provided on small cavities, and fine materials can be removed with the filter.

Furthermore, the filter corresponding to a metal photoetching product of claim 1 is etched. Therefore, it can be smoothly finished, and deburring and trimming are not required as compared with products produced using mechanical methods. A person with ordinary skill in the art cannot infer the metal photoetching product of claim 1 merely by combining the methods disclosed in 848 and 373.

In view of the above, claim 1 and claim 14 depending from claim 1 patentably distinguish over the prior art at least by reciting the following features:

- $D1 + D2 = \text{plate thickness } D$, $0.02 \text{ mm} \leq D \leq 2 \text{ mm}$, $0.4 \times D < W_1S < D$, and $0.2 \times D < W_2S < 0.8 \times D$; and
- at least one combination of the large cavity and the smallest hole formed in the large cavity has an etching factor of 2.6 or more, where the etching factor is $EF = ED/SE$ wherein EF represents the etching factor, ED represents an etched depth of a cavity to be evaluated, SE represents a primary side etching which is a half of a difference between a dimension of an opening of the cavity formed by primary etching and a dimension of an opening of a photoresist pattern used for the primary etching, and when there are two primary side etchings as a result of photoetching conducted from both upper and lower surfaces of a metal substrate, SE represents the larger one.

Due to the recited characteristics, the metal photoetching product of claim 2 has excellent performance when it is used as a micro channel wherein channel cross section is large, for example. The metal photoetching product of claim 2 is an etching product which has a shallow large cavity and a deep small cavity. When this etching product is used as a micro channel and then the deep small cavity is used as a channel and the shallow large cavity is used as an inlet pass, a channel excellent in processing efficiency is obtained. On the other hand, in products made using the conventional methods, the micro channel which has a deep large cavity and a shallow small cavity which do not have the claimed etching factor. Thus, conventionally, the processing efficiency being poor additional processing conditions such as an increased number of small cavities are required in order to improve the processing efficiency.

The metal photoetching product of claim 2 does not appear to be produced by a person with ordinary skill in the art using the 848 and 373 methods.

In view of the above, the metal photoetching product of claim 2 patentably distinguishes over the prior art at least by reciting:

- $0.02 \text{ mm} \leq D \leq 2 \text{ mm}$, $0.5 \times W_1S < D1 < D$, $0.5 \times W_2S < D2 < D$, $1.7 \times W_2S < W_1S < 5 \times W_2S$, and $0.5 \times D2 < D1 < 1.5 \times D2$, and
- at least one of the large cavity and the small cavity has an etching factor of 2.6 or more, where the etching factor is $EF=ED/SE$ wherein EF represents the etching factor, ED represents an etched depth of a cavity to be evaluated, SE represents a primary side etching which is a half of a difference between a dimension of an opening of the cavity formed by primary etching and a dimension of an opening of a photoresist pattern used for the primary etching, and when there are two primary side etchings as a result of photoetching conducted from both upper and lower surfaces of a metal substrate, SE represents the larger one.

Claim 15 is patentable at least by inheriting patentable features from claim 2.

The metal photoetching product of claim 3 has excellent performance, when used as a rear plate member of a plasma display panel, for example. The metal photoetching product of claim 3 is an etching product which has a deep large cavity and a shallow small cavity. When this etching product is used as a rear plate member of a plasma display panel, the rear plate member may have a metal bulkhead structure with plural large partition portions, in each of which plural shallow small cavities are formed between two large deep cavities on the top surface.

On the other hand, when a deep large cavity and a shallow small cavity are to be formed using a conventional method, such as 848 and 373, the cavities do not have claimed etching factor and, therefore, the contrast between the depth and the width between the cavity and the partition portions, are not as large as when the claimed product is used. A rear plate member which has the required target effects cannot be produced using the conventional methods. Such a specific combination of a deep large cavity and a shallow small cavity as claimed cannot be achieved by a person of ordinary skill in the art by combining the methods of 848 and 373.

In view of the above, claim 3 and claim 16 depending from claim 3 patentably distinguish over the cited prior art at least because the following features of claim 3 are not anticipated or rendered obvious:

- $0.02 \text{ mm} \leq D \leq 2 \text{ mm}$, $0.5 \times W_1S < D1 \leq D$, $0.5 \times W_2S < D2 \leq D$, $W_2S < W_1S < 2.0 \times W_2S$, and $0.2 \times D1 < W_2S < 0.8 \times D1$, and
- at least one of the large cavity and the small cavity has an etching factor of 2.6 or more, where the etching factor is $EF=ED/SE$ wherein EF represents the etching factor, ED represents an etched depth of a cavity to be evaluated, SE represents a primary side etching which is a half of a difference between a dimension of an opening of the cavity formed by primary etching and a dimension of an opening of a photoresist pattern used for the primary etching, and when there are two primary side etchings as a result of photoetching conducted from both upper and lower surfaces of a metal substrate, SE represents the larger one.

Independent claim 4 and claims 17 and 18 depending from claim 4 patentably distinguish over the cited prior art at least because the following recitation of claim 4 is not rendered obvious:

- the metal pattern has a form comprising a cavity provided by at least second etching which has a different form than a cavity provided by the primary etching.

Independent claim 5 and claim 19 depending from claim 5 patentably distinguish over the cited prior art at least because the following features recited in claim 5 are not rendered obvious:

- a processed portion having a metal pattern of a complex and three-dimensional shape
- an etching factor of an opening of the metal pattern is 2.6 or more, where the etching factor is $EF=ED/SE$ wherein EF represents the etching factor, ED represents an etched depth of a cavity to be evaluated, SE represents a primary side etching which is a half of a difference between a dimension of an opening of the cavity formed by primary etching and a dimension of an opening of a photoresist pattern used for the primary etching, and when there are two primary side etchings as a result of photoetching conducted from both upper and lower surfaces of a metal substrate, SE represents the larger one.

CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

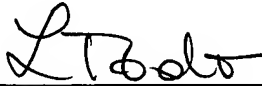
If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

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